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Intestinal Adhesions

Present Status of Prevention and Treatment

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• **Although many treatments have been proposed for the prevention of intestinal adhesions, none has been completely effective. For bowel obstruction due to adhesions the initial approach should be conservative. If operation becomes necessary, the best results depend on avoidance of trauma and infection, division of adhesions with cautery, use of mesothelial grafts, instillation of intraperitoneal hyaluronidase and stimulation of early postoperative peristalsis. In the event of massive adhesions or failure of other treatment, intestinal plication is the treatment of choice.**

ONE OF THE MOST perplexing complications following abdominal operations is bowel obstruction secondary to intestinal adhesions. Intestinal adhesions rarely occur without a history of an abdominal operation and commonly the intervention was either appendectomy or a gynecological procedure. The obstruction is almost always of the small intestine and in about one-fourth of patients strangulation occurs.

The initial operative treatment is usually lysis by sharp dissection of the obstructing adhesions. However, many patients treated in this way return with repeated episodes of bowel obstruction and may undergo laparotomy a dozen or more times for lysis of recurrent adhesions. Many surgeons believe there is no adequate solution to the problem of adhesions and obstruction.

It is well known that the severity of adhesions is related in part to mechanical trauma and sepsis, and therefore attempts to control these etiological factors have merit. Trauma to peritoneal surfaces causes inflammation and exudate which, in turn, lead to adhesions. The common mechanical insults at the time of operation are rough handling of tissues, improper use of retractors, excessive packing with gauze, use of dry gauze, unnecessary sponging, contamination with glove powder, mass ligatures and the use of unnecessarily large needles, sutures and hemostats. Other common sources of peritoneal injury are bacterial, chemical and thermal trauma.

Although it was previously believed that all denuded areas of peritoneum should be closed by oversewing, several recent investigators have questioned this. Robbins, Brunschwig and Foote[22] noted that although it was often impossible to cover large peritoneal defects in patients undergoing extensive exenteration procedures for malignant disease, postoperative obstruction from adhesions rarely occurred. These investigators and others[26,28] reaffirmed in experiments on animals that any form of reperitonealization increases the incidence of adhesions.

After experimental observation that there was less

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recurrence after adhesions were freed by cautery, several investigators[21,29] have recommended this method of lysis. The reason for the better result, they explained, was that division by coagulation left dead tissue on exposed surfaces and healing occurred beneath before separation of the eschar.

Many ways to prevent recurrent adhesions have been proposed, among them the interposition of foil or membranes to keep adjacent areas of bowel from touching, feeding an iron suspension by mouth and then moving a magnet over the abdomen postoperatively, introduction of various solutions, such as saline and glucose solutions and amniotic fluid, and use of the enzymes papain and trypsin. None of them has stood the test of time.[3]

During the past two decades a number of other agents have been recommended as effective in preventing recurrent adhesions. In the early 1940's the sulfonamides were thought to hold promise for this purpose. It was hoped that their power to combat infection would preclude adhesion formation. However, both experimental and clinical studies showed that in powdered form the sulfonamides cause adhesions and are thus more harmful than beneficial.[9]

Prevention of coagulation of the exudate at the site of peritoneal injury may prevent the formation of adhesions, since fibrin provides the framework for the migration of capillaries and fibroblasts. The only anticoagulant which has been effective in preventing adhesions is heparin.[12] The recommended dose of 40,000 units was given intraperitoneally over a period of three days, starting at the time of operation. Twenty-one cases in which heparin was used have been reported.[12,13,14] In three of them the patients died of hemorrhage, while in two recurrent obstruction developed. No clinical reports on the use of heparin against adhesions have appeared in the last ten years.

Omental grafts were suggested many years ago as a means of covering traumatized bowel to prevent adhesions, but use of them was abandoned. The method has been revived with some success.[15,30] and more recently the use of only the mesothelium as a graft has been reported.[4] The graft may be taken from mesentery, omentum, falciform ligament or parietal peritoneum. There is both experimental and clinical evidence that this is a useful method of covering small areas of injured bowel and preventing recurrent adhesions.

In an effort to prevent prolonged contact of peritoneal surfaces, some investigators gave 0.25 mg. of prostigmine every four hours for 48 hours, after lysis was carried out, to stimulate early peristalsis.[5,23] Experimental studies showed that in animals so treated the recurrences were fewer and less dense than in animals treated with atropine rather than prostigmine. No reports of use of this method in humans have appeared but experimental results are promising enough to recommend clinical trial.

The use of plasmin and streptokinase-streptodornase to prevent adhesions has also been investigated in the laboratory.[11,25] The rationale is that these agents act as fibrinolysins which interrupt the mechanism of formation of adhesions by removing fibrin. Since the evidence in support of these agents is contradictory and no clinical studies have been reported, further animal investigation is in order before clinical application can be recommended.

Hyaluronidase has been studied as a preventive agent against adhesions. It has been postulated that it promotes absorption of fibrin and other elements of exudate, although other observers[27] have expressed belief that it acts by suppression of fibroblasts. While experimental studies have shown that it does not completely prevent adhesions,[6,7] results have indicated that its use leads to a decrease in the number and density of adhesions. Of twenty-six patients in whom hyaluronidase was used, only two had subsequent obstruction in a ten-year follow-up.[16] The drug was employed intraperitoneally, after lysis of adhesions, in a dose of 37,500 units in 20 cc. of saline solution.

Corticotropin, cortisone and hydrocortisone have been studied with regard to effect on the formation of adhesions. The available experimental reports suggest that although these drugs are effective in delaying the formation of adhesions they do not prevent or modify the final extent of such lesions.[2] In limited clinical use, cortisone has been ineffective in preventing adhesions.[10]

Plication of the intestine is another approach to the problem of adhesions. Advocates of this procedure, believing that there is no satisfactory method of preventing adhesions, hold that control over the points at which adhesions occur is the only likely way to prevent recurrent obstruction. The method of intestinal plication, first described in 1937,[17] consists of folding the small bowel back and forth on itself and holding it in position by suture of the mesentery. This is carried out after all adhesions have been divided, whether they are obstructing or not. There have been enthusiastic reports concerning this operation,[19,20,24] and many patients who had had countless previous operations for adhesions remained free of obstruction thereafter. The overall reported rate of recurrent obstruction following plication is 12 per cent,[8] and most of the cases in which obstruction did recur were those in which the plicated bowel did not stay together, or where not enough small bowel was included in the plication. The best results were obtained when the entire small bowel was plicated. The technical details of the operation have been well described by Noble[18] and Barron and Fallis.[1]

CONCLUSIONS

The initial approach to bowel obstruction due to intestinal adhesions should be conservative. This consists of intubation, suction and supportive therapy. However, unless evidence of recovery is prompt and unequivocal, operative intervention is imperative.

At operation, careful cleansing of gloves, avoidance of trauma to peritoneal surfaces and absolute asepsis are necessary. The obstructing adhesions should be divided by coagulating cautery. Small peritoneal defects should be covered by grafts of mesothelium from omentum or mesentery. Large peritoneal defects should be let alone. Hyaluronidase solution should be instilled into the peritoneal cavity before closure. Except in the case of anastomosis, the bowel should be stimulated toward early peristalsis by drugs.

In the event the above regimen is not successful, or for the patient with massive adhesions, plication of the entire small bowel is the most effective therapy available.

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